

NODE=B009

N(1860) 5/2⁺ $I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$ Status: **

OMITTED FROM SUMMARY TABLE

Before the 2012 Review, all the evidence for a $J^P = 5/2^+$ state with a mass above 1800 MeV was filed under a two-star $N(2000)$. There is now some evidence from ANISOVICH 12A for two $5/2^+$ states in this region, so we have split the older data (according to mass) between two two-star $5/2^+$ states, an $N(1860)$ and an $N(2000)$.

NODE=B009

N(1860) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1820 to 1960 (≈ 1860) OUR ESTIMATE			
1860 $^{+120}_{-60}$	ANISOVICH	12A	DPWA Multichannel
1817.7	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
1882 ± 10	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1900 ± 7	SHRESTHA	12A	DPWA Multichannel
1814	ARNDT	95	DPWA $\pi N \rightarrow N\pi$
1903 ± 87	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$

NODE=B009M

NODE=B009M

→ UNCHECKED ←

N(1860) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
270 to 490 Our Estimate			
270 $^{+140}_{-50}$	ANISOVICH	12A	DPWA Multichannel
117.6	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
95 ± 20	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
219 ± 23	SHRESTHA	12A	DPWA Multichannel
176	ARNDT	95	DPWA $\pi N \rightarrow N\pi$
490 ± 310	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$

NODE=B009W

NODE=B009W

N(1860) POLE POSITION

REAL PART VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1830 $^{+120}_{-60}$	ANISOVICH	12A	DPWA Multichannel
1807	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1863	SHRESTHA	12A	DPWA Multichannel

NODE=B009215

NODE=B009RE

NODE=B009RE

-2×IMAGINARY PART VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
250 $^{+150}_{-50}$	ANISOVICH	12A	DPWA Multichannel
109	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
189	SHRESTHA	12A	DPWA Multichannel

NODE=B009IM

NODE=B009IM

N(1860) ELASTIC POLE RESIDUE

MODULUS r VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
50 ± 20	ANISOVICH	12A	DPWA Multichannel
60	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

NODE=B009220

NODE=B009RER

NODE=B009RER

PHASE θ VALUE (°)	DOCUMENT ID	TECN	COMMENT
-80 ± 40	ANISOVICH	12A	DPWA Multichannel
-67	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

NODE=B009IMR

NODE=B009IMR

N(1860) DECAY MODES

NODE=B009225;NODE=B009

Mode				
Γ_1	$N\pi$			DESIG=1
Γ_2	$N\eta$			DESIG=6
Γ_3	ΛK			DESIG=7
Γ_4	$N\pi\pi$			DESIG=2
Γ_5	$\Delta(1232)\pi$, P-wave			DESIG=3
Γ_6	$\Delta(1232)\pi$, F-wave			DESIG=8
Γ_7	$N\rho$, S=3/2, P-wave			DESIG=4
Γ_8	$N\rho$, S=3/2, F-wave			DESIG=5
Γ_9	$N(\pi\pi)^{I=0}_{S-wave}$			DESIG=9
Γ_{10}	$p\gamma$			DESIG=10
Γ_{11}	$p\gamma$, helicity=1/2			DESIG=11
Γ_{12}	$p\gamma$, helicity=3/2			DESIG=12
Γ_{13}	$n\gamma$			DESIG=13
Γ_{14}	$n\gamma$, helicity=1/2			DESIG=14
Γ_{15}	$n\gamma$, helicity=3/2			DESIG=15

N(1860) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$			Γ_1/Γ	
VALUE (%)	DOCUMENT ID	TECN	COMMENT	
20 ± 6	ANISOVICH	12A	DPWA Multichannel	
12.7	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
4 ± 2	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
17 ± 1	SHRESTHA	12A	DPWA Multichannel	
10	ARNDT	95	DPWA $\pi N \rightarrow N\pi$	
8 ± 5	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$	

$\Gamma(N\eta)/\Gamma_{total}$			Γ_2/Γ	
VALUE (%)	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
4 ± 2	SHRESTHA	12A	DPWA Multichannel	

$\Gamma(\Lambda K)/\Gamma_{total}$			Γ_3/Γ	
VALUE (%)	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
<1	SHRESTHA	12A	DPWA Multichannel	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1860) \rightarrow \Delta(1232)\pi$, P-wave			$(\Gamma_1\Gamma_5)^{1/2}/\Gamma$	
VALUE	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
-0.03 ± 0.03	SHRESTHA	12A	DPWA Multichannel	
+0.10 ± 0.06	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$	

$\Gamma(\Delta(1232)\pi, F\text{-wave})/\Gamma_{total}$			Γ_6/Γ	
VALUE (%)	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
<1	SHRESTHA	12A	DPWA Multichannel	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1860) \rightarrow N\rho$, S=3/2, P-wave			$(\Gamma_1\Gamma_7)^{1/2}/\Gamma$	
VALUE	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
-0.07 ± 0.03	SHRESTHA	12A	DPWA Multichannel	
-0.22 ± 0.08	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1860) \rightarrow N\rho$, S=3/2, F-wave			$(\Gamma_1\Gamma_8)^{1/2}/\Gamma$	
VALUE	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc.				• • •
+0.11 ± 0.06	MANLEY	92	IPWA $\pi N \rightarrow \pi N & N\pi\pi$	

NODE=B009230

NODE=B009R1
NODE=B009R1NODE=B009R05
NODE=B009R05NODE=B009R06
NODE=B009R06NODE=B009R02
NODE=B009R02NODE=B009R07
NODE=B009R07NODE=B009R03
NODE=B009R03NODE=B009R04
NODE=B009R04

$\Gamma(N(\pi\pi)_{S-wave}^{l=0})/\Gamma_{\text{total}}$

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_9/Γ</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
41±6	SHRESTHA	12A	DPWA Multichannel	

NODE=B009R08
NODE=B009R08**N(1860) PHOTON DECAY AMPLITUDES** **$N(1860) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$**

<u>VALUE (GeV$^{-1/2}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_9/Γ</u>
0.020±0.012	¹ ANISOVICH	12A	DPWA Phase = (120 ± 50) $^\circ$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.017±0.003	SHRESTHA	12A	DPWA Multichannel	

NODE=B009235

NODE=B009A1
NODE=B009A1 **$N(1860) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_9/Γ</u>
0.050±0.020	¹ ANISOVICH	12A	DPWA Phase = (-80 ± 60) $^\circ$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.029±0.004	SHRESTHA	12A	DPWA Multichannel	

NODE=B009A2
NODE=B009A2 **$N(1860) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$**

<u>VALUE (GeV$^{-1/2}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_9/Γ</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.010±0.005	SHRESTHA	12A	DPWA Multichannel	

NODE=B009A3
NODE=B009A3 **$N(1860) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$**

<u>VALUE (GeV$^{-1/2}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_9/Γ</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.009±0.005	SHRESTHA	12A	DPWA Multichannel	

NODE=B009A4
NODE=B009A4**N(1860) FOOTNOTES**¹ This ANISOVICH 12A value is the complex helicity amplitude at the pole position.**N(1860) REFERENCES**

ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
ARNDT	95	PR C52 2120	R.A. Arndt <i>et al.</i>	(VPI, BRCO)
MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KSA)
Also		PR D30 904	D.M. Manley <i>et al.</i>	(VPI)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT)

NODE=B009
NODE=B009A1;LINKAGE=AN

NODE=B009

REFID=54041
REFID=54862
REFID=51535
REFID=44535
REFID=41535
REFID=30071
REFID=30058